

# UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

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Docket No. : 33853/PYI/I148  
 Inventor(s) : Daniel S. KWOH, and Henry C. YUEN  
 Title : APPARATUS AND METHODS FOR VOICE TITLES  
 Express Mail Label No. : EL078837247US

ADDRESS TO: Assistant Commissioner for Patents  
 Box Patent Application  
 Washington, D.C. 20231

Date: December 30, 1998

1. ☒ **FEE TRANSMITTAL FORM** *(Submit an original, and a duplicate for fee processing).*
2. **IF A CONTINUING APPLICATION**  
☒ This application is a Continuation-in-Part of patent application No. 08/894,145; filed August 12, 1997. **(A copy of this letter is enclosed for filing in the prior application file.)**  
  
☒ This application claims priority pursuant to 35 U.S.C. §119(e) and 37 CFR §1.78(a)(4), to provisional Application No. 60/070,056, filed December 30, 1997.
3. **APPLICATION COMPRISED OF**  
**Specification**  
☒ 25 Specification, claims and Abstract (total pages)  
  
**Drawings**  
☒ 16 Sheets of drawing(s) (FIGS. 1 to 19)  
  
**Declaration and Power of Attorney**  
☒ Newly executed (2)  
☐ No executed declaration  
☐ Copy from a prior application (37 CFR 1.63(d))(for continuation and divisional)
4. ☐ **Microfiche Computer Program** *(Appendix)*
5. ☐ **Nucleotide and/or Amino Acid Sequence Submission** *(if applicable, all necessary)*  
☐ Computer Readable Copy  
☐ Paper Copy (identical to computer copy)  
☐ Statement verifying identity of above copies
6. **ALSO ENCLOSED ARE**  
☐ Preliminary Amendment  
☐ A Petition for Extension of Time for the parent application and the required fee are enclosed as separate papers  
☐ Small Entity Statement(s)  
☐ Statement filed in parent application, status still proper and desired  
☐ Copy of Statement filed in provisional application, status still proper and desired

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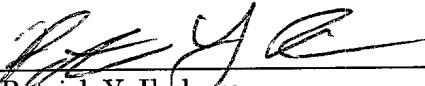
- \_\_\_\_\_ An Assignment of the invention with the Recordation Cover Sheet and the recordation fee are enclosed as separate papers
- \_\_\_\_\_ This application is owned by pursuant to an Assignment recorded at Reel , Frame
- \_\_\_\_\_ Information Disclosure Statement (IDS)/PTO-1449
- \_\_\_\_\_ Copies of IDS Citations
- \_\_\_\_\_ Certified copy of Priority Document(s) (*if foreign priority is claimed*)
- \_\_\_\_\_ English Translation Document (*if applicable*)
- X   Return Receipt Postcard (MPEP 503) (should be specifically itemized).
- \_\_\_\_\_ Other

**7. CORRESPONDENCE ADDRESS**

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## 1 APPARATUS AND METHODS FOR VOICE TITLES

## CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is a continuation-in-part of application  
Serial No. 08/894,145, filed on August 12, 1997, now pending, and  
U.S. Provisional patent application No. 60/070,056, filed on  
December 30, 1997, disclosures of which are incorporated herein  
by reference.

10 Field of the Invention

This invention relates generally to video cassette recorder  
systems and camcorders and methods and apparatus for recording  
and reproducing titles for programs recorded thereon.

15 Description of the Related Art

20 Video cassette recorders and camcorders use video tape,  
which by its nature is a sequential medium that is recorded and  
accessed sequentially. Mass storage devices that can only be  
accessed sequentially, include: analog audio tapes used for audio  
cassette drives; video tapes used with video cassette recorders  
(VCRs); digital audio tapes; digital tape drives and tape backup  
cassette drives for use with computers; and analog tape drives  
for instrumentation purposes. All of these devices use magnetic  
tape as the storage media. The big advantage of sequential  
25 medium, such as tape, is low cost compared with random access  
devices, such as semiconductor random access memory.

30 It is desirable to know the contents and location of  
programs on a tape. A directory recorded on the tape or stored  
in an apparatus can be used to access a particular program on the  
tape, as disclosed in continuation-in-part application Serial No.  
08/176,852.

35 Owners of tapes desire to title programs on the tapes to  
enable rapid identification and access of the program thereon.  
One method is to title a tape and programs on the tape by hand  
by writing titles on a label fastened to the tape cartridge or

1 its box. However, the tape can become separated from the box,  
or the label may fall off. Some tape owners repeatedly record  
over the same tape and prefer not to use permanent labels.  
Computer tapes may contain hundreds of records or files and  
5 handwriting or updating the index onto the box is not practical.

Placing a descriptive title on the tape itself presents  
other problems. Video titling for a program such as a movie is  
well known, but these titles are part of the movie and a typical  
home user cannot modify or edit these titles and the user must  
10 play the movie to access the title. Professional video titling  
systems include the well-known Chyron system. Typically these  
systems include a complete computer, a complex, high-resolution  
character generator, a special effects generator for making  
shadows, italics and other effects, and a video interface to  
15 generate a video signal. Such systems are too expensive and  
complicated for the home video market.

Some videocassette recorders (VCRs) and camcorders are  
equipped with simple character generators for displaying simple  
block letters and numbers, either superimposed over a recorded  
video signal or recorded and mixed with the picture signal. A  
20 typical camcorder application is to add characters representing  
the recording date and time to a video signal as it is being  
recorded, thereby adding a "date stamp." In VCRs, the character  
generator can be used to show programming information such as  
25 channel, date, and time on screen as the VCR is being programmed  
to record programs at a future date. However, currently there  
is no simple way to add titles to tapes or programs recorded on  
the VCR.

Another problem with prior art titling systems is data input  
30 and editing. With Chyron systems, a full-size typewriter-style  
keyboard is used which is inappropriate for home use and slow for  
poor typists. Editing of a title is impractical with most  
home-generated titles, because the title is recorded as a video  
image on the tape. Also, there are many situations, where adding  
35 a title by entering characters is not at all convenient.

1     Summary of the Invention

          In accordance with the present invention, an audio signal is generated of a title for a video program recorded on a magnetic medium, e.g. video tape. The audio signal is recorded on the video tape as a voice title. Thereafter, the voice title is used as part of an on-screen directory to gain access to video programs stored on the video tape for playback.

          In one embodiment, the voice titles are audibly reproduced from the video tape on command when the directory for a video tape is displayed. If desired, the directory could display a message that a voice title of a video program is available along with the titles in textual form of other video programs recorded on the video tape.

          In another embodiment, the voice titles are integrated with video segments recorded on a camcorder. The voice titles are digitized by an analog to digital converter and encoded by a vertical blanking interval encoder for recording in the vertical blanking interval lines of the video segment. It is another object of the invention that a date and time read from a clock in a camcorder can be recorded in the vertical blanking interval of a video segment.

          In another embodiment, the voice titles are stored on the video tape and audibly reproduced therefrom on command when the directory for a video tape is retrieved from the video tape or RAM and displayed. If the directory is retrieved from RAM, it could display a message that a voice title of a video program is available along with the titles in textual form of other video programs recorded on the video tape.

          In another embodiment, the voice titles are stored in the RAM where the directory is stored and readout with the titles and index information of the other video programs. The voice titles could either be converted to digitized audio signals or converted to alphanumeric textual signals before storage in the RAM.

          In another embodiment, video programs are recorded on a video tape and audio signals of titles for the recorded programs

1 are generated. The audio signals are recorded as voice titles  
and the voice titles are converted to textual titles. A  
directory of the video programs recorded on the tape including  
the textual titles are displayed on a screen. A video program  
5 from the directory is selected and the audio signal corresponding  
to the selected video program is reproduced to appraise a user  
of the voice title of the selected video program.

In accordance with the present invention an apparatus for  
providing voice titles for video segments on a sequential medium  
10 includes means for recording an index mark at the start of a  
video segment onto the sequential medium for marking the start  
of the video segment, means for indicating the start of a voice  
title, means for recording a voice title onto the sequential  
medium in the vertical blanking interval of the video segment and  
15 means for indicating an end of the voice title. The apparatus  
further includes means for recording a voice title present  
indicator into the sequential medium in the vertical blanking  
interval of the video segment. A time-of-recording, which can  
include a date of recording, is also recorded onto the sequential  
20 medium in the vertical blanking interval of the video segment.

#### Brief Description of the Drawings

FIG. 1 is an illustration of a prior art method of  
adding a title to a program recorded on a camcorder;

25 FIG. 2 is a block diagram of a camcorder including the  
capability for voice titles according to the present invention;

FIG. 3 is a graphical representation of the format of the  
information recorded on the magnetic tape in the camcorder of  
FIG. 2 with the voice title in the audio track and markers in the  
30 control track according to the present invention;

FIG. 4 is a block diagram illustrating an indexing video  
cassette recorder that provides indexing of recorded programs  
using a directory and that has the capability for voice titles  
for programs according to the present invention;

35 FIG. 5 is a block diagram of the digitizer shown in FIG. 4;

1           FIG. 6 is a block diagram of the voice synthesizer shown in  
FIG. 4;

5           FIG. 7 is a schematic conceptually illustrating volume data  
including a volume voice title stored in the RAM of the directory  
controller of FIG. 4 according to the present invention;

          FIG. 8 is a schematic conceptually illustrating a structure  
of directory data for programs including program voice titles  
stored in the RAM of the directory controller of FIG. 4 according  
to the present invention;

10          FIG. 9 is a flowchart showing the steps employed to index a  
previously recorded tape in an indexing VCR that uses TPA packets  
according to the present invention;

15          FIG. 10 is a schematic view of an embodiment for storing TPA  
packet and VISS marks in the control track of a tape to assist  
in the accessing of programs on the tape according to the present  
invention;

          FIG. 11 shows the format of a TPA packet according to the  
present invention;

20          FIG. 12 is a flowchart showing the steps employed to add  
voice title to a program being recorded on a camcorder or a VCR  
according to the present invention;

          FIG. 13 is a flowchart showing the steps employed to detect  
a voice title and digitize the voice title for storing it into  
a directory according to the present invention;

25          FIG. 14 is a flowchart showing the steps employed to use  
voice titles for access of a program to play according to the  
present invention;

30          FIG. 15 is a block diagram of a camcorder including the  
capability for voice titles and including a memory for storing  
digitized voice titles according to the present invention;

          FIG. 16 is a block diagram of a camcorder having the  
capability of recording voice titles in the vertical blanking  
interval of video segments recorded onto a sequential tape  
according to the present invention;

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1 FIG. 17 is a screen display of a segment directory according to the present invention;

FIG. 18 is an alternative screen display of a directory that combines voice titles and textual titles; and

5 FIG. 19 is an alternative embodiment of the indexing video cassette recorder of FIG. 4.

#### Detailed Description of the Specific Embodiments

Referring now to the drawings, and more particularly, to  
10 FIG. 1, there is shown an illustration of a prior art method of adding a title to a program recorded on a camcorder. For example, the SONY Handycam CCD-F330 is a camcorder that allows a user to superimpose a time and date and also a title onto a program being recorded. To record a date or time the user pushes  
15 a DATE SET or TIME SET button and the time or date are recorded along with the program. Later when the recording is played, the date or time is visible on a monitor.

To record a title the user first stores a title into the camcorder. This is done by drawing the title on a title card and  
20 then focusing the camera on the title card and pressing a MEM TITLE button. Then while recording a program, the stored title can be superimposed on the program by pressing a TITLE button. As shown in FIG. 1, the memorized title 102 is superimposed on the program being recorded, represented by frame 100, to form a  
25 composite recording 103. This method of titling has limited utility and requires that a title card be made so that the title can be memorized.

FIG. 2 is a block diagram of a camcorder 200 including the capability for voice titles according to the present invention.

30 The camcorder 200 has the conventional elements of a camcorder including: a lens 202 and camera electronics 204; a microphone 224 and amplifier 226; a write head 210 which can write on a tape 212 and a read head 228 that can read the tape 212; video electronics 230; and monitor 232. In many camcorders  
35 it is possible to record the time or the date on the video track.



1 Clock 205 provides the time or date 206 which can be superimposed  
onto the video via adder 208. Many conventional camcorders  
include a video out 234 and audio out 235 which can be used to  
5 television monitor. Camcorder 200 is controlled by  
microcontroller 214. Control buttons 216 including record button  
218 and play button 220 are inputs to microcontroller 214. Voice  
title button 222 is provided to allow a user to indicate that the  
10 following audio is a voice title. In one embodiment the user  
presses voice title button 222 once and then records a title by  
speaking into the microphone 224, and then pushes the voice title  
button 222 again to indicate the end of the voice title. The  
voice title is recorded onto the audio track of tape 212.

15 FIG. 3 is a graphical representation of the format of the  
information recorded on a tape, such as tape 212 in the camcorder  
200 of FIG. 2, showing a voice title 250 recorded in an audio  
track 242 and voice title markers 252 and 254 recorded in the  
control track 246 according to the present invention. (Instead  
20 of recording voice title 250 in audio track 242, it could be  
recorded in the vertical blanking interval of the video signal  
before, during, or after recording. The tape 212 can be 8 mm  
tape used in some camcorders, a BETA format tape, or a VHS format  
tape, all of which use the same general tape layout. The tape  
25 212 is divided into three areas. A narrow strip running along  
the upper edge of the tape 212 is an audio track 242 which  
contains audio signals. A second narrow strip running along the  
bottom edge of the tape is a control track 246 which contains  
control signals. The middle area 244 is for video signals which  
are recorded in pairs of parallel fields going up and down the  
30 width of the tape at a slight angle.

Various signals can be recorded in the control track  
including VISS marks, which are described below in relation to  
FIG. 10, and voice title (VT) marks 252 and 254, as shown in FIG.  
3. The VT mark 252 and VT mark 254 indicate the beginning and  
35 the end, respectively, of voice title 250, which is recorded in

1 the audio track 242. The first time the user presses the voice  
title button 222, the VT mark 252 is recorded, and the second  
time the user presses the voice title button 222, the VT mark 254  
is recorded.

5 FIG. 4 is a block diagram illustrating an indexing video  
cassette recorder 10 that provides indexing of recorded programs  
using a directory and that has a voice title capability according  
to the present invention. The indexing VCR 10 includes a video  
cassette reader/recorder (VCR) function with a directory  
10 controller function 30. External to the indexing VCR 10 is a  
television monitor 50 and a remote controller 75. The VCR  
function is a video tape reader/recorder means and uses any one  
of many different recording technologies such as BETA, VHS, super  
VHS, 8 mm, VHS-C or any other popular technologies. In  
15 particular, VHS-C indexed tapes can be played directly on a VHS  
indexing VCR with full index functioning. The cassette 40 is a  
conventional video cassette having a magnetic tape 42 packaged  
in a cartridge 40a or cassette housing (hereafter called  
cassette) and transported between a feeding spindle 40b and a  
20 takeup spindle 40c. Even though the size and design of the  
housing is different for different types of recording technology,  
the basic information that goes on the tape itself is similar.  
The technology and operation of a VCR are well understood in the  
art.

25 The indexing VCR 10 has a button control panel 3 with  
control buttons, including LOAD 3a, PLAY 3b, STOP 3c, RECORD 3d,  
EJECT 3e, and VOICE TITLE 3f for controlling the operation of the  
VCR. The LOAD button 3a is optional and is not used on machines  
which load automatically. The VCR control logic circuit 21  
30 receives control signals from the button control panel 3 and  
controls the overall operation of the VCR by sending control  
signals to a motor and mechanical control logic circuit 5, a  
video logic circuit 7, a position logic and counter circuit 9,  
and a control and audio track head logic circuit 11, as well as

35

1 to the microprocessor controller 31 of the directory controller  
30.

5 The motor and mechanical control logic circuit 5 controls  
loading and ejecting of the cassette 40 and also controls  
movement of the video tape 42 within the video cassette 40 during  
recording, reading (playback), fast forward, and rewind. The  
video logic circuit 7 controls the operation of a video  
read/write head drum 13 in reading from or recording video  
10 signals to the tape 42. The electrical signals are magnetically  
coupled between the video logic circuit 7 and the video head drum  
13 using a winding 14. The position logic and counter circuit  
9 monitors tape movement through a cassette tape movement sensor  
22 and generates signals that represent tape position. The  
control and audio track head logic circuit 11 controls writing,  
15 reading, and erasing of signals on the control or audio track of  
the tape 42 through the write head 19, the read head 17, and the  
erase head 15.

20 The directory controller 30 includes a microprocessor  
controller 31, a random access memory (RAM) 33 and a directory  
input/output display and control panel 32. Preferably the  
microprocessor controller 31 comprises an integrated circuit  
microprocessor, a program store 31a, such as a read-only-memory  
(ROM), for storing a control program to implement methods of the  
invention, and a clock 31b for generating a clock signal for  
25 timing functions and providing the time. The time may be set  
using the directory input/output display and control panel 32 in  
a manner known in the art. The microprocessor controller 31  
controls the operation of the directory controller 30 and  
interfaces with the VCR control logic circuit 21 to implement the  
30 necessary functional capabilities for reading, updating and  
writing the directory. The microcontroller processor 31 in the  
indexing VCR 10 performs all indexing functions and human  
interface, interprets (e.g. tab, indent, screen format,  
attributes) and processes the auxiliary information display.

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1       The RAM 33 is a conventional random access semiconductor  
memory which interfaces directly with the microprocessor  
controller 31. The RAM 33 is preferably non-volatile.  
Alternatively, the RAM 33 has a battery backup. The battery  
5 backup should maintain the contents of the memory for a  
predetermined time, e.g., 7 days, after the loss of power. The  
retention time may be shorter, if the indexing VCR uses an  
automatic backup of the memory onto video tape. A portion of the  
RAM 33, shown as system data 33b, is used for storing the system  
10 software of the microprocessor controller 31. The RAM 33 is also  
used for storing the program directory 33a. Portions of the RAM  
33 are used as memory for digitized voice titles. The size of  
the RAM 33 is at the discretion of the manufacturer. However,  
the RAM 33 preferably can store the directory of at least 400  
15 tapes. Accordingly, the RAM 33 has preferably at least 256  
kilobits of memory for library storage. Effective memory size  
of the RAM 33 may be increased by using well known data  
compression techniques. Data recorded in the RAM 33 may be  
encoded or scrambled.

20       The directory input/output display and control panel 32 has  
an alphanumeric keyboard 32a and special function keys, such as  
a SEARCH key 32b for commanding searches for data in the  
directory 33a and on the tape 42, a MODIFY key 32c for modifying  
or deleting directory information in the RAM 33, and an ENTER key  
25 32d for entering program directory information. Instead of  
providing special function keys, functions can also be initiated  
by entering predefined sequences of conventional keys on the  
alphanumeric keyboard 32a.

30       A display 32e is a conventional liquid crystal or other type  
display for displaying data being entered on the keyboard 32a,  
and to display the directory or other information stored in the  
RAM 33. Alternately, data can be shown on-screen a television  
display 50a. The directory information stored in the RAM 33 is  
processed by the microprocessor controller 31.

1           The VCR 10 additionally comprises a character generator  
circuit 23 coupled to the VCR control logic circuit 21 and to a  
character generator read-only memory (ROM) 25. Character  
generators are well-known in the art. Typically, the character  
5       generator ROM 25 stores a data table representing pixel or bit  
patterns of a plurality of alphanumeric characters, such as the  
Roman alphabet and the Arabic numerals. Upon command by the VCR  
control logic circuit 21 and the character generator circuit 23,  
10       the data in the character generator ROM 25 is read and placed in  
an output signal to a video display, such as television 50, at  
a position on the display determined by coordinates generated by  
the microprocessor controller 31, or the characters could be sent  
to display 32e. The end result is visual display of a  
alphanumeric character on the display screen.

15           As shown in FIG. 4, vertical blanking interval (VBI) signal  
decoder 60a is coupled to the output of a tuner 61, which is  
generally included in the majority of consumer VCRs for  
off-the-air recording. The vertical blanking interval is the  
time that the beam on a television is retracing from the bottom  
20       to the top of the screen. During this interval video is not  
written to the screen, thus, information can be sent during the  
vertical blanking interval. The tuner 61, which receives a  
broadcast TV signal from an antenna 63, a cable TV signal source  
64, or a satellite receiver system, provides the signals to a VBI  
25       decoder 60a which decodes data recorded on the VBI of the  
received video signal. In some applications, a VBI encoder 60b  
encodes data onto the VBI of the video signal that is to be  
recorded onto the video tape 42. Directory data can be  
encoded in the VBI and retrieved by the VBI decoder 60a and  
30       provided to the directory controller for storage in RAM 33. For  
example, the directory data can include the program name and the  
program type. Note that directory data can also be entered into  
RAM 33 by using keypad 32a.

35           A decoder signal line 65 is coupled from the decoder to the  
VCR control logic circuit 21 to carry decoded VBI data to the

1 control logic circuit. The VCR control logic circuit 21 is  
commanded by the microprocessor controller 31 to pass the decoded  
data to the directory 33a under control of a stored program in  
the RAM 33. The stored program then causes the VBI information  
5 to be stored as in the directory. The directory data can be  
displayed on the television 50 or the display 32e.

The indexing video cassette recorder 10 shown in FIG. 4 also  
has a voice title capability. The voice title capability is  
provided by microphone 264 which is coupled to VCR control logic  
10 21, digitizer 262 which is coupled between VCR control logic 21  
and RAM 33, and voice synthesizer 260 which is coupled between  
RAM 33 and VCR control logic 21. The user of indexing VCR 10 can  
record a voice title on the tape 42 by pressing voice title  
button 3g and speaking a title into microphone 264. The end of  
15 the voice title is indicated by again pressing voice title button  
3g. The voice title is recorded on tape 42 in the audio track  
and the voice title markers are recorded in the control track of  
tape 42 in the same manner as shown in FIG. 3. In an alternate  
embodiment, a button is provided on remote controller 75 for  
20 indicating a voice title. The button on the remote controller  
would operate in the same manner as voice title button 3g. As  
shown in FIG. 4, inputs are provided to microprocessor controller  
31 for inputting the camcorder video out 234 and the camcorder  
audio out 235.

25 Voice titles entered via microphone 264 are digitized by  
digitizer 262 and stored in RAM 33. FIG. 5 is a block diagram  
of the digitizer 262 shown in FIG. 4. The digitizer may be as  
simple as an analog to digital converter 270, or may include  
additional digital signal processing functions such as filtering.  
30 The digital output of the analog to digital converter 270 can be  
compressed by digital compressor 272 before being sent to RAM 33  
in order to save memory.

Upon command the voice titles can be read from RAM 33 and a  
voice output synthesized in voice synthesizer 260 and output to  
35 a speaker in television 50. Alternatively, a speaker (not shown)

1 can be provided internal to the VCR 10. FIG. 6 is a block  
diagram of the voice synthesizer 262 shown in FIG. 4. The voice  
synthesizer includes a digital to analog converter 278 and can  
include a digital decompressor 274 for decompressing a compressed  
5 voice title. The digital compressor 272 and the digital  
decompressor 274 may include various digital signal processing  
functions, such as filtering, which are well known in the art.

In another embodiment of the indexing VCR 10 shown in FIG.  
4, the remote controller 75 not only has a transmitter 84 for  
10 transmitting commands to the indexing VCR that are received by  
remote signal receiver 29, but can also receive signals  
transmitted by transmitter 88 in indexing VCR 88 via receiver 86  
in remote controller 75. In a particular embodiment the remote  
controller has a microphone 80 which can be used by the user to  
15 enter a voice title. Keys on the remote controller are used to  
mark the beginning and the end of the voice title. The remote  
controller transmits the audio via transmitter 84 to receiver 29  
in the indexing VCR 10. In another embodiment, a voice title  
that is synthesized from the voice title stored in RAM 33 is sent  
20 to transmitter 88 and transmitted in a wireless manner to  
receiver 86 in remote controller 75 and then sent to speaker 82.  
By including a microphone 80 and a speaker 82 in the remote  
controller 75 that has bi-directional wireless communication to  
the indexing VCR 10, the user has the capability of remotely  
25 entering and reviewing voice titles. This can be very useful if  
the user is across the room from the VCR when the user desires  
to enter a voice title.

The format of the directory and the voice title storage in  
RAM 33 is now described by referring to FIGs. 7 and 8. FIG. 7  
30 is a schematic conceptually illustrating volume data including  
a volume voice title 288 stored in the RAM 33 of the directory  
controller 30 of FIG. 4 according to the present invention. FIG.  
8 is a schematic conceptually illustrating a structure of  
directory data for programs including program voice titles stored  
35

1 in the RAM 33 of the directory controller 30 of FIG. 4 according to the present invention.

5 A library 280, as shown in FIG. 7, is stored in the RAM 33 and the library 280 stores directories of tapes, which users of the VCR 10 have archived. Each volume 282a, 282b, 282c corresponds to a tape and within each volume is a directory to the programs on the tape. The first volume 282a has a pointer 284 to the second volume 282b and so on. The first volume also has a volume voice title pointer 286 that points to the volume voice title 288. When the user is scanning through the library, 10 the voice title of each volume can be accessed and sent to voice synthesizer 260 and then to the TV 50 speaker via VCR control logic 21.

15 FIG. 8 is a detailed view of the contents of volume 282a. The first entry 300 is a volume number, which is followed by the address of the next volume 284. This is followed by the address 304 of the first program entry in the volume. The volume voice title pointer 286, as explained above, points to the volume voice title 288. For each program recorded on the cassette tape, there is a corresponding directory entry 310. For purposes of 20 illustration, FIG. 8 shows the entry 310 for only program 1. Each entry 310 stores: a title or program name 312; a program address 313, which contains an address on the tape for the beginning of the program; a program length value 314, which stores the length of the recorded program; an optional program 25 type field 315, which stores the category of the recorded program; an optional program audience field 316, which stores the recommended audience of the program; an optional recording speed 317, which stores the speed at which the program is recorded; a program voice title pointer 318, which points to the location of the program voice title 330; and a next program entry address 30 320, which points to the next program entry.

35 A current tape location (not shown) is also stored in the directory for indicating the position from the beginning of the tape 42 in the cassette 40 when the tape is ejected. This field



1 is used for setting a tape counter when the tape is reloaded into VCR 10.

Each item in the directory can be modified through the use of the buttons on the keyboard 32a and the special function keys 32b, 32c, 32d of the directory controller 32, and as indicated above, the directory may be written from data decoded from the VBI.

The volume voice titles stored in the directory can be used by the user to determine the tapes stored in the directory and to select a tape to play. Then the user can use the program voice titles to select a program to play.

FIG. 9 is a flowchart showing the steps employed to index a previously recorded tape in the indexing VCR 10 using TPA packets and VISS marks and is another method of generating a directory for a tape. In this method a directory for the tape is created and stored in the RAM 33. Tape identification, program number and absolute address (TPA) packets and VISS marks are recorded on the control track 246 of the tape, as shown in FIG. 10.

The user inserts the un-indexed recorded tape, which for example could be a tape recorded on a camcorder, into the VCR 10 and actuates the re-indexing by entering a command via keypad 32a or by selecting the indexing operation from a set of choices displayed on directory display 32e (step 401). The microprocessor controller 31 assigns a tape identification number (TID) (step 402). (The microprocessor controller 31 also displays the tape number to the user so that when the user ejects the tape he may write the tape number onto the cassette housing.) The microprocessor controller 31 commands the VCR to rewind the tape to the beginning of the tape (step 403). The microprocessor controller 31 displays an instruction for the user to advance the tape to the start of the first program (step 404). During such tape movement, the microprocessor controller 31 measures the absolute address using, for example, the method described in pending patent application serial No. 08/167,285, filed December 15, 1993, our reference No. 25845/LWT, which is incorporated

herein by this reference, as though set forth in full (step 405). In response to an INDEX command from the user, the microprocessor controller 31 writes a VISS mark in the control track 246 (step 406). The microprocessor controller 31 then displays on the display 32e a prompt to the user to enter the title of the first program or show on the tape (step 407). The microprocessor controller 31 assigns a program number to the program (step 408). The microprocessor 31 then stores the directory information in the RAM 33 at a location in the volume corresponding to the TID (tape identification number) (step 409). Then in step 414 TPA packets are written into the control track as shown in FIG. 10. FIG. 11 shows the format of a TPA packet according to the present invention. TPA packets continue to be written while the tape is advanced and the absolute address is measured for each TPA packet written. Then the user indicates that the last program on the tape has been reached by pressing a button that is not used for entering a title, for example the search button 32b and the indexing VCR exits the reindexing routine (step 411). Otherwise, the microprocessor controller 31 then prompts the user on the display 32e to fast forward (FF) the tape to the beginning of the next program (step 412). Note that throughout this description the indexing could be performed by remote control and the display of instructions can be performed by TV 50.

The tape has now been indexed with VISS marks at the beginning of each program and TPA packets, as shown in FIG. 10. The associated directory information is stored in the RAM 33 of the VCR 10. The operation of the VCR 10 when an indexed tape is inserted therein is described in continuation-in-part of application Serial No. 08/176,852, which also describes other methods of indexing.

Now the methods for recording and retrieving voice titles for a program recorded on a camcorder or a VCR are described with reference to FIGs. 12 through 14.

1 In step 500 of FIG. 12 it is assumed that the camcorder or  
VCR are in the record mode. In step 502 it is determined whether  
a voice title button is pushed. If a voice title button has been  
pushed then the camcorder/VCR records a voice title voiced by a  
5 user on the tape in step 504. In step 506 the user pushes a  
voice title button again to mark the end of the voice title. The  
result is a recorded voice title as shown in FIG. 3.

FIG. 13 is a flow chart showing the steps employed to detect  
a voice title and digitize the voice title for storing it into  
10 a directory. In step 510 it is determined whether the tape is  
being played for the first time in the VCR. Then in step 512 it  
is determined whether a voice title mark is detected in the  
control track of the tape. If a voice title mark is detected,  
then in step 514 the voice title is converted from analog to  
15 digital and possibly compressed. When the voice title end mark  
is detected in step 515, the entire voice title is stored with  
the program directory information in the directory memory. The  
program number associated with the voice title can be determined  
by reading the TPA packet adjacent to the voice title on the  
20 tape.

FIG. 14 is a flow chart showing the steps employed to use  
voice titles for accessing programs to play. In step 520 the  
user accesses the directory memory. Then in step 522 the user  
selects any program in the directory by means of an onscreen  
25 cursor and in step 524 a voice title for the program entry is  
accessed from the directory memory responsive to a voice title  
play command generated by pressing an assigned button on remote  
75. Then in step 526 a voice is synthesized from the accessed  
voice title by decompression and digital to analog conversion.  
30 Then in step 528 the synthesized voice is sent to a speaker and  
then in step 530 the user can either select the program  
corresponding to the voice title or can proceed to listen to the  
next voice title in the directory. If the user selects to play  
the program, then in step 532 the program address in the  
35

1 directory is used to access the program on the tape and then the VCR is put into a play mode.

FIG. 15 is a block diagram of an alternate configuration of a camcorder that includes a memory for storing digitized voice titles. FIG. 15 is very similar to FIG. 2, except that a digital memory 154 has been added to the camcorder. An analog to digital converter and digital compressor 552 is coupled to amplifier 226 for digitizing audio input and is coupled to memory 554 in order to store the digitized audio into the memory. The memory can also be used to store a directory in the same manner as RAM 33 of FIG. 4. Upon command a voice title can be read from memory 554 and decompressed and sent to digital analog converter 556 and output via audio electronics 562 to speaker 564. Note that the audio amplifier 226 is coupled to the write head to write the audio onto tape 212 and that the read head 228 is coupled to speaker 564. In operation the user would press voice title button 222 to record a title, and then speak into microphone 224. The spoken title would be digitized and stored in memory 554. The voice titles in memory 554 can be accessed in the manner indicated in FIG. 14 by using controls 216.

FIG. 16 is a schematic of a camcorder similar to the camcorder shown in FIG. 15, except that the camcorder of FIG. 16 has a vertical blanking interval encoder 600. The vertical blanking interval line encoder 600 receives an input from analog to digital (A/D) converter 552 and also an input from the time/date 206 that is read from clock 205. The VBI encoder 600 has an interface to microcontroller 214. In one embodiment a memory 602 is accessible via the VBI encoder 600 and the microcontroller 214. To record a voice title onto tape 212, the user presses voice title button 222 and speaks into microphone 224. The voice title is digitized by A/D converter 552 and possibly compressed and then the digitized voice title is encoded by vertical blanking interval encoder 600 and written into the vertical blanking interval lines in the video segment being recorded on tape 212. In FIG. 16 the path for writing VBI

1 encoded information onto the tape is shown to be via  
microcontroller 214 which has an interface to write head 210.  
The VBI encoder 600 can also be used to record a time/date stamp  
5 read from time/date 206 into the vertical blanking interval lines  
of a video segment being recorded on the tape 212.

If a voice title is recorded onto tape 212 then the  
microcontroller 214 can also record a voice present indicator  
into the vertical blanking interval lines of the video segment  
being recorded on the tape. The microcontroller sends the voice  
10 title present indicator to the VBI encoder 600 which encodes the  
voice title present indicator for writing it into the vertical  
blanking interval lines of the video segment.

A voice title recorded in the vertical blanking interval  
lines of a video segment can be reviewed by a user by sending  
15 controls to microcontroller 214 which can access the proper  
position of the tape 212 and via the read head 228, a vertical  
blanking interval decoder 604 can extract the voice title from  
the video segment and the voice title can be "spoken" by speaker  
564.

20 FIG. 17 shows a display of a segment directory on a display  
which could be a television or a display on the camcorder or VCR.  
As shown, a segment directory contains the date and time of each  
segment, the length of each segment and whether or not a voice  
title is available for the segment. The user selects a segment  
25 for playing by moving a cursor 692 to the desired segment. In  
FIG. 21 the cursor 692 is at a segment which was recorded on  
January 31, 1994 at the time 15:50:10. The length of the segment  
is 45 minutes and a voice title is available as indicated by the  
Y (699).

30 FIG. 18 shows an alternative, hybrid format in a screen  
display 640. In this format a reference to the voice titles such  
as shown at 642 and a reference to the textual titles such as  
shown at 644 are combined in the same directory. If desired the  
information in FIG. 17 could also be incorporated in the format  
35 of FIG. 18. The reference to each voice title on the screen is

1 linked to the memory address of the corresponding compressed  
digitized voice title data stored in RAM 33 by the described  
pointers. Thus, when the user selects a voice title reference  
on the screen with a cursor 646, the title is audibly reproduced  
5 by the speaker as a substitute for the text titles displayed on  
the screen. Thus, in either case, the user can decide whether  
to retrieve and play a stored video program based on its title.

FIG. 19 illustrates an alternative embodiment of the  
10 indexing video cassette recorder of FIG. 4. The voice titles  
generated by microphone 264 are coupled through VCR control logic  
21 to a voice recognition circuit 700, which converts the audio  
signals to textual form. The converted voice titles in the form  
of coded alphanumeric binary signals are stored in RAM 33 as part  
15 of the video tape directories. Thus, they are indistinguishable  
when displayed by television monitor 50 from the other titles of  
directories stored in RAM 33. If desired, the converted voice  
titles, or any other titles in the directories for that matter,  
could be converted back to voice titles by a voice synthesizer  
20 710 prior to display of the directory on television monitor 50  
and reproduced audibly, either instead of or in addition to the  
textual titles. Preferably, voice recognition circuit 700 and  
voice synthesizer 710 are implemented in software executed by  
microprocessor controller 31 (FIG. 4).

25 The described embodiments of the invention are only  
considered to be preferred and illustrative of the inventive  
concept, the scope of the invention is not to be restricted to  
such embodiments. Various and numerous other arrangements may  
be devised by one skilled in the art without departing from the  
30 spirit and scope of this invention. It is therefore intended by  
the appended claims to cover any and all such applications,  
modifications and embodiments within the scope of the present  
invention.

1 WHAT IS CLAIMED IS:

1. A method for providing voice titles for video programs recorded on a video tape comprising the steps of:

5 recording video programs on the tape;  
generating audio signals of titles for the recorded programs;

recording the audio signals as voice titles;  
displaying on a screen a directory of the video  
10 programs recorded on the tape;  
selecting one of the video programs from the directory;  
and

reproducing the audio signal corresponding to the  
selected video program to apprise a user of the voice title of  
15 the selected video program.

2. The method of claim 1, in which the audio signal is generated while the video program is being recorded.

20 3. The method of claim 2, in which the audio signal is recorded while the video program is being recorded.

4. The method of claim 3, in which the tape has an audio track and the audio signal is recorded in the audio track.

25 5. The method of claim 3, in which the recorded video program has a vertical blanking interval and the audio signal is recorded in the vertical blanking interval.

30 6. The method of claim 3, additionally comprising the step of marking the end of the recorded audio signal on the tape.

7. The method of claim 6, additionally comprising the steps of:

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1           transporting the tape after the audio signal has been  
recorded; and

          transferring the audio signal to a random access memory  
(RAM) for later use to select programs for playback.

5           8. The method of claim 7, in which the transferring step  
comprises digitizing the audio signal and recording the digitized  
audio signal in the RAM.

10          9. The method of claim 8, in which the transferring step  
additionally comprises compressing the audio signal before  
recording it in the RAM.

15          10. The method of claim 9, additionally comprising the step  
of recording in the RAM with the audio signal other data to  
assist in the playback of the recorded program.

20          11. The method of claim 10, in which the other data includes  
the tape location of the start of the recorded program.

25          12. The method of claim 11, in which the other data includes  
the length of the recorded program.

30          13. The method of claim 12, in which the other data includes  
voice title designations.

35          14. The method of claim 13, in which the voice title  
designations include the day and time of recording.

          15. The method of claim 14, in which the voice title  
designations include the length of the program.

          16. The method of claim 15, in which the step of recording  
the audio signals as voice titles comprises storing the audio



1 signals on the video tape while the video program is being  
recorded.

5 17. The method of claim 16, additionally comprising the step  
of positioning the tape at the beginning of a video program  
responsive to the other data.

10 18. The method of claim 17, additionally comprising the  
step of reading and playing the video program and the step of  
reading and storing the audio signals for the played video  
program and the other data in RAM.

15 19. The method of claim 1, additionally comprising the step  
of playing the selected video program.

20 20. The method of claim 1 in which the generating step  
comprises speaking the titles into a microphone.

25 21. The method of claim 1, in which the generating step  
comprises speaking the titles into a microphone contemporaneously  
with the step of recording the video program.

30 22. The method of claim 1, in which the displaying step  
displays voice title designations for the recorded video programs  
for which voice titles are recorded.

35 23. The method of claim 22, additionally comprising the  
step of recording video programs without recording voice titles,  
the displaying step also displaying the titles of the video  
programs recorded without voice titles along with the voice title  
designations.

24. A method of claim 1, additionally comprising the step  
of converting the voice titles to textual titles.

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## 1 APPARATUS AND METHODS FOR VOICE TITLES

Abstract of the Disclosure

5 An apparatus for providing voice titles for recorded programs includes a recorder (11,19) for recording on a sequential recording medium, which has an audio recording portion (242) and a control recording portion (246). A control input (222) is provided for indicating a start of a voice title and the start indicator (252) is recorded on the control recording  
10 portion of the sequential medium. A microphone (264) or other device is provided for entering a voice title and for recording the entered voice title onto the audio recording portion of the sequential medium sequentially following the recorded indication of the start of the voice title in the control recording portion.  
15 A control input (222) is provided for indicating an end of the voice title and the end indicator (254) is recorded onto the control recording portion of the sequential medium sequentially following the recorded voice title in the audio recording portion. The apparatus includes an analog to digital converter  
20 (270) for digitizing the entered voice title and a memory (33) for storing the digitized voice title. Another embodiment of the apparatus includes a voice synthesizer (260) for synthesizing a voice from the stored digitized voice title.

25

NML PAS165978.1--12/30/98 2:54 pm

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*FIG. 1*

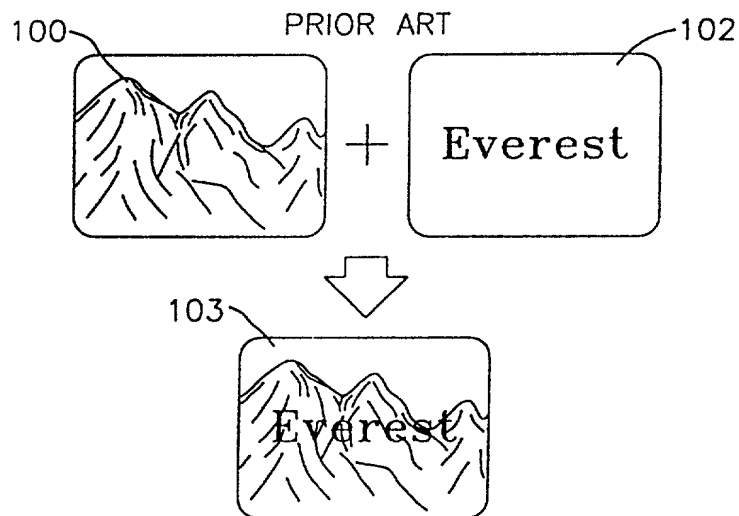


FIG. 2

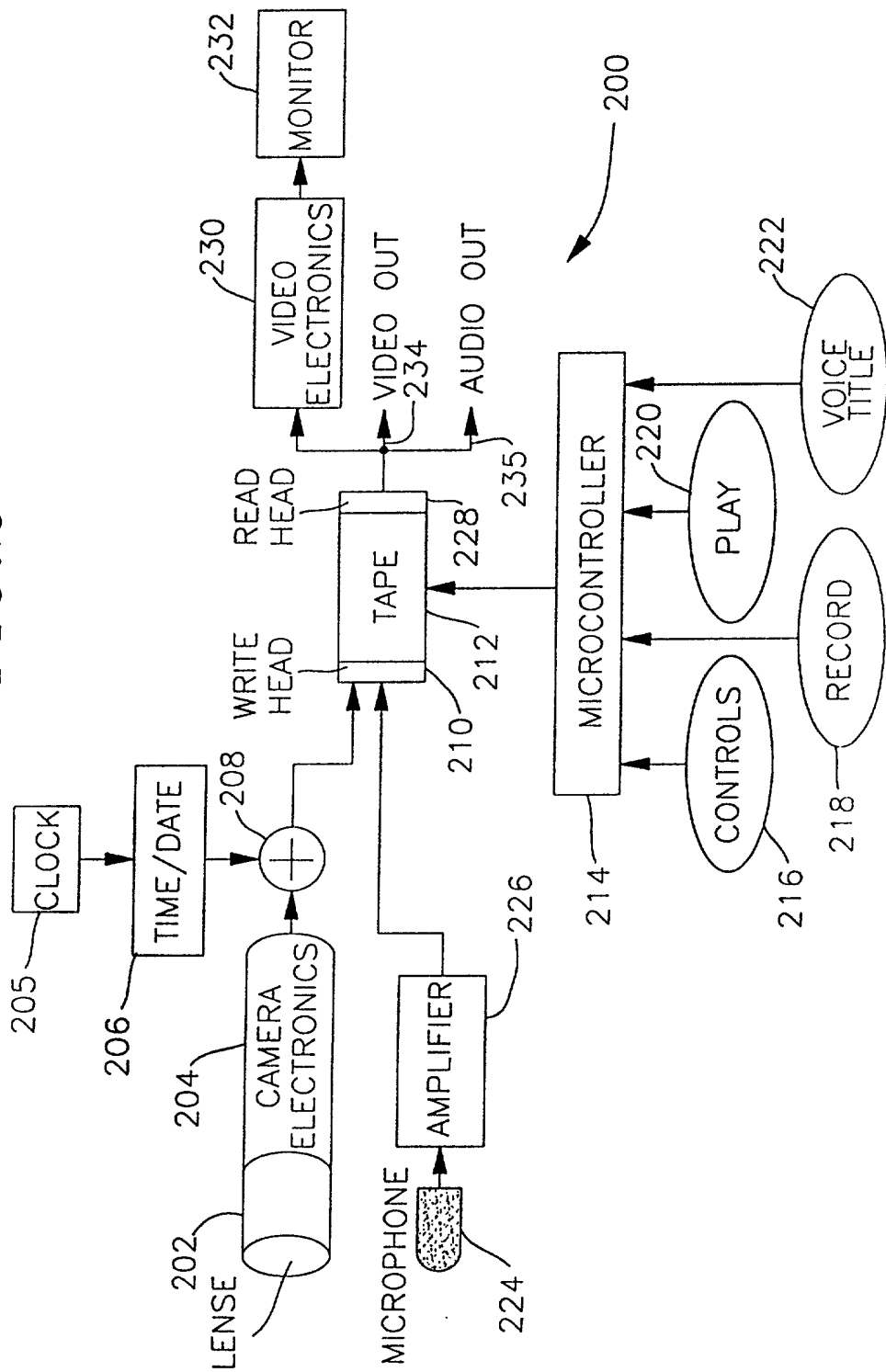
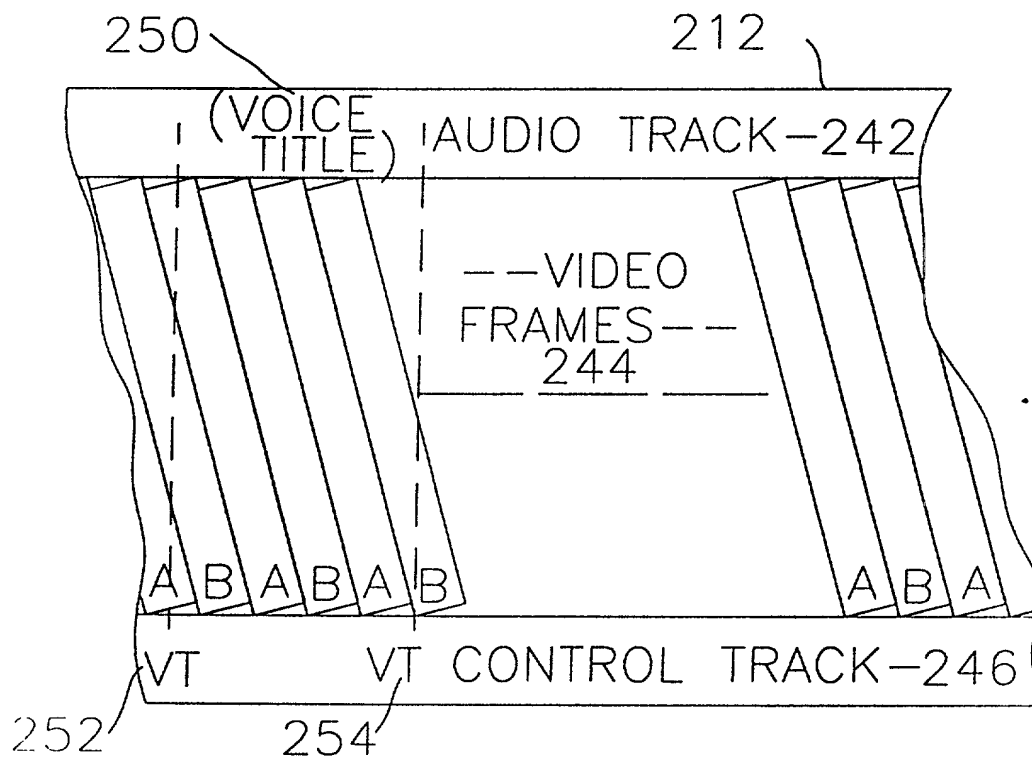


FIG. 3



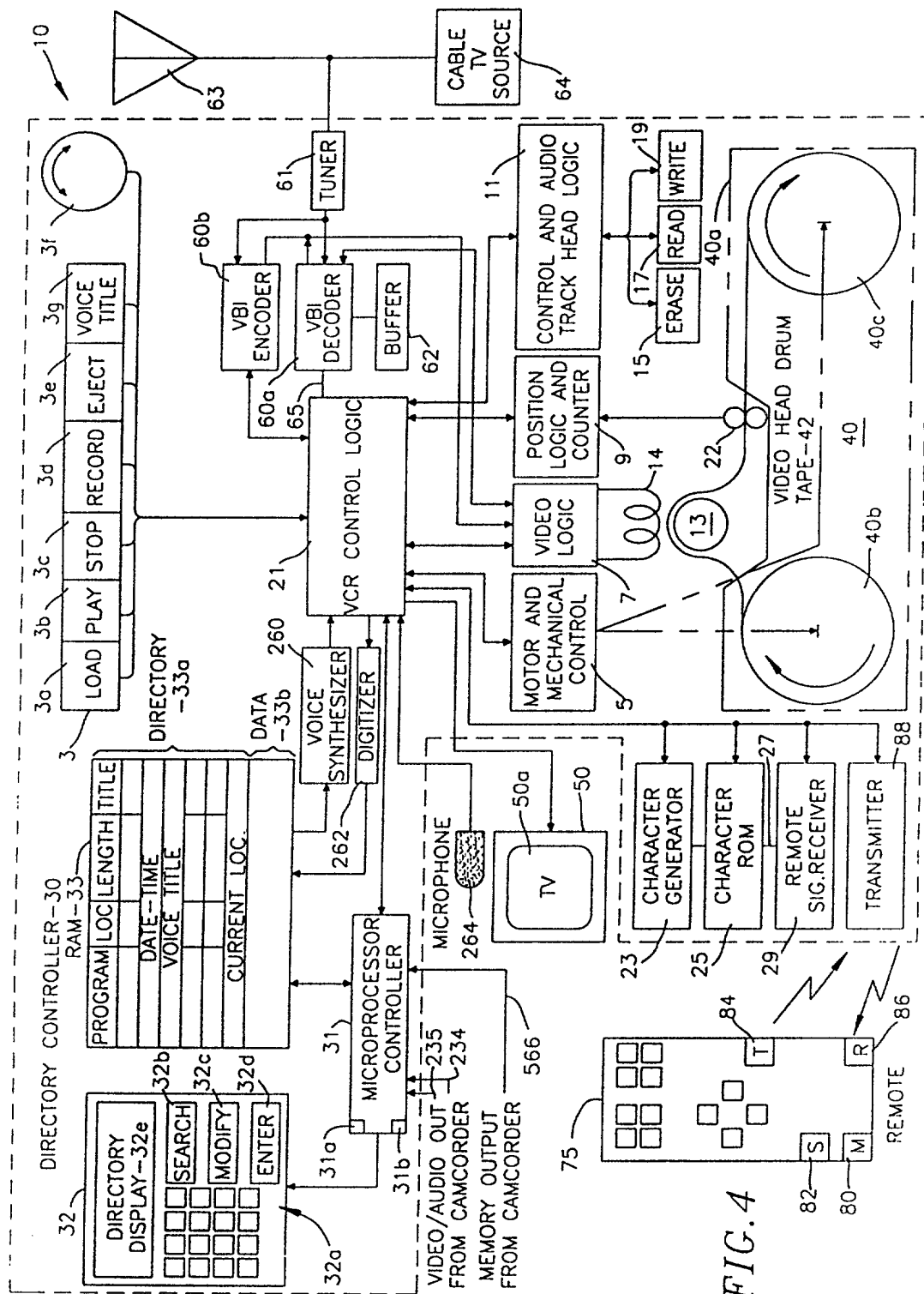


FIG. 4

FIG. 5

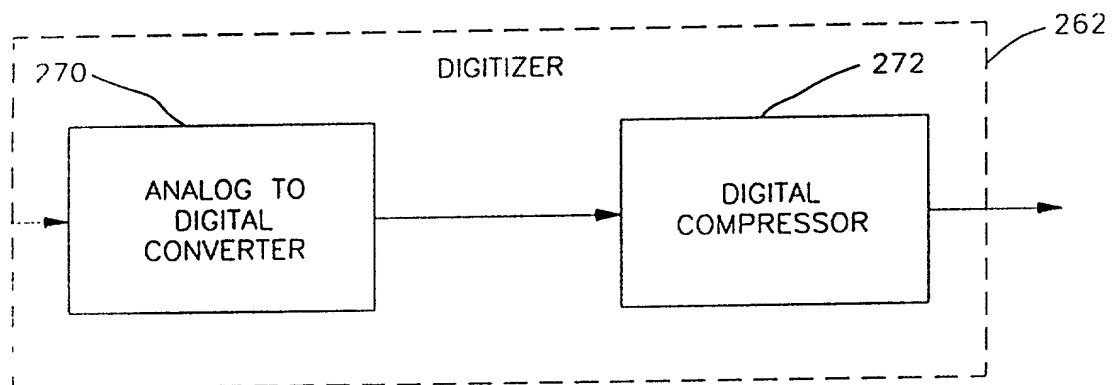
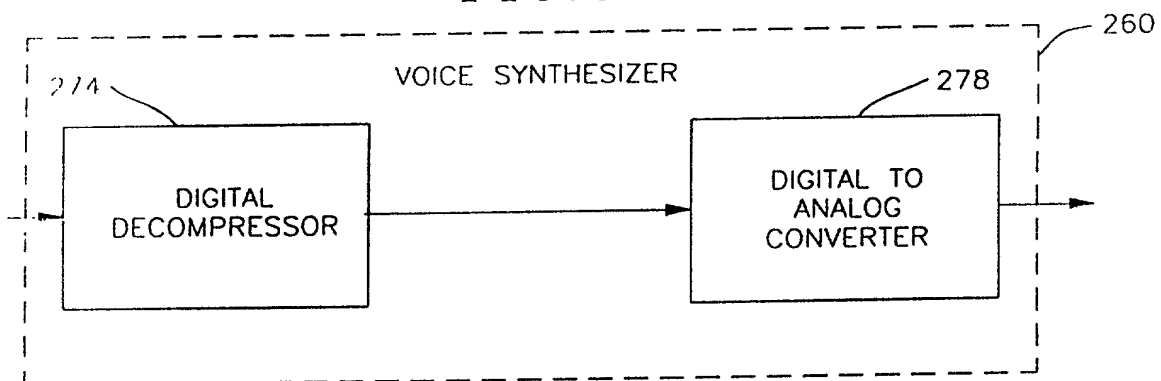
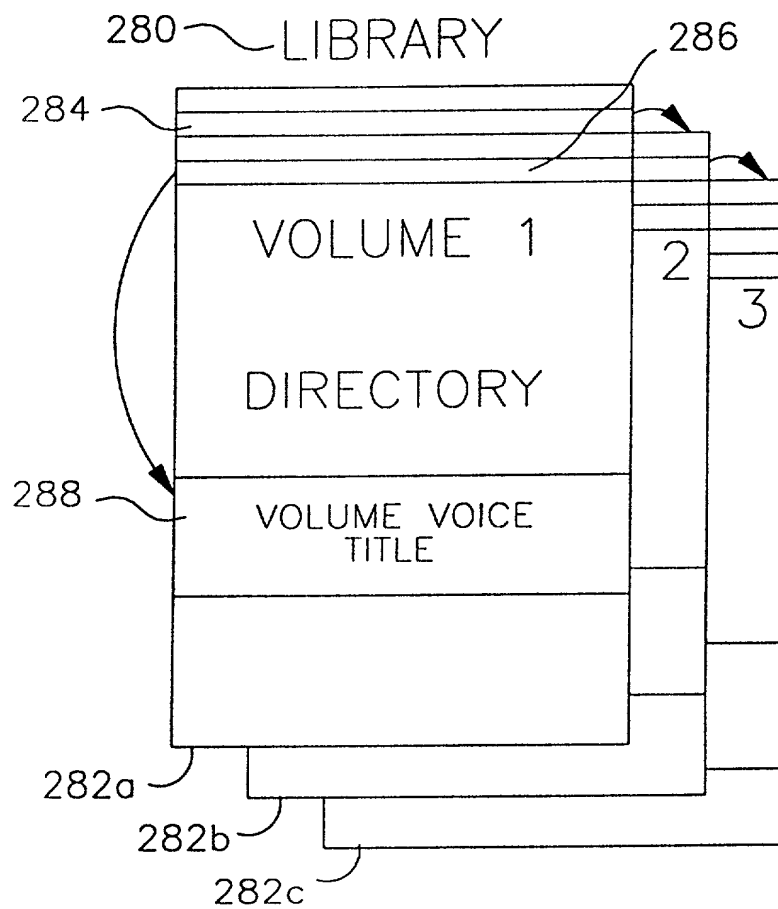


FIG. 6





*FIG. 7*



# FIG. 8

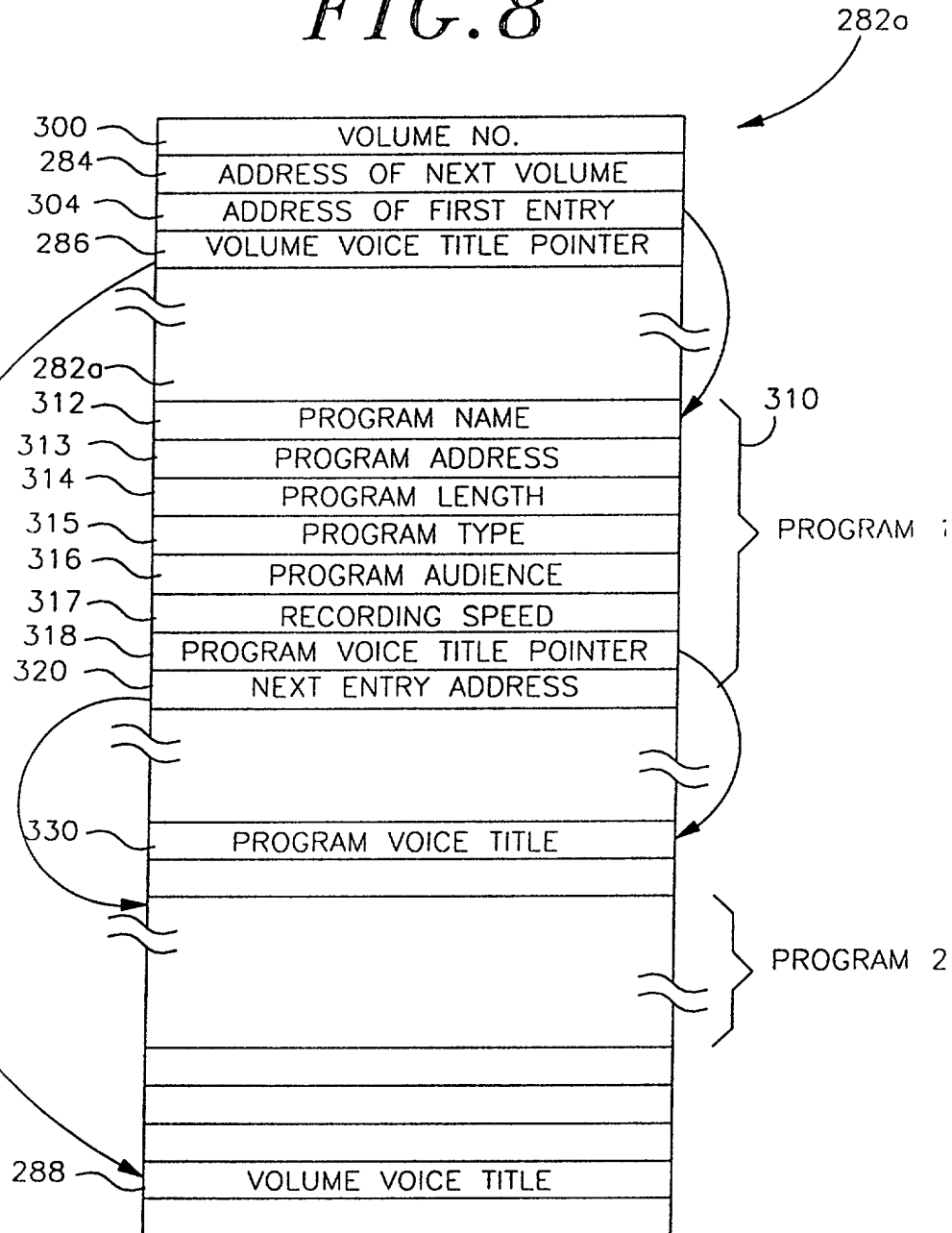


FIG. 9

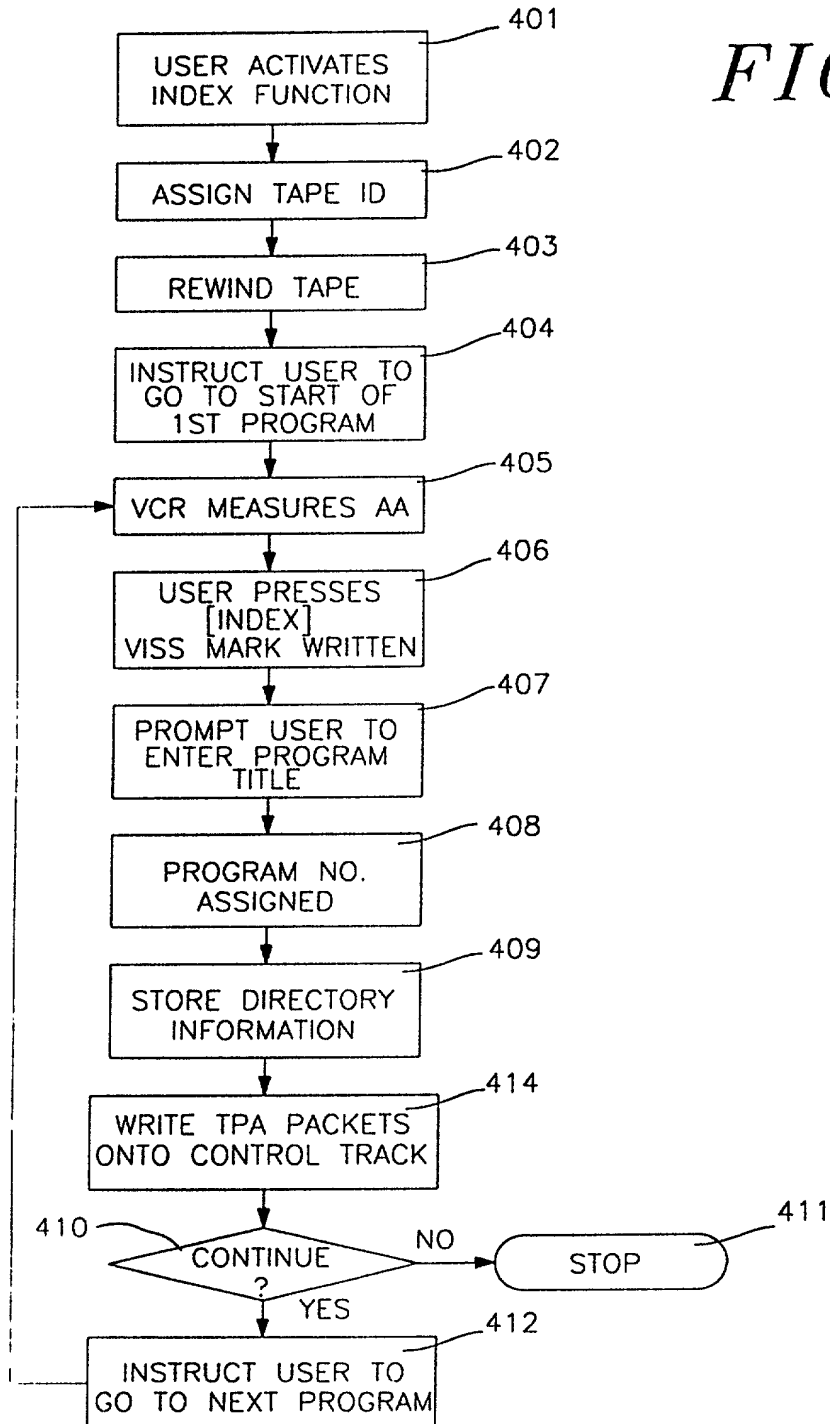


FIG. 10

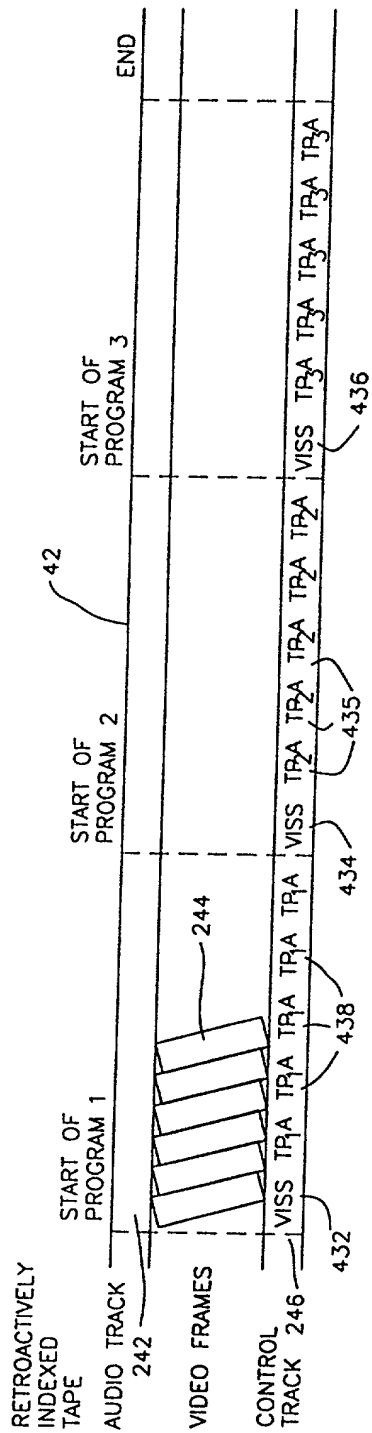


FIG. 11

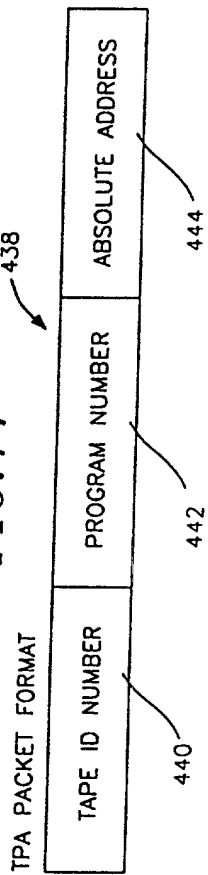


FIG. 12

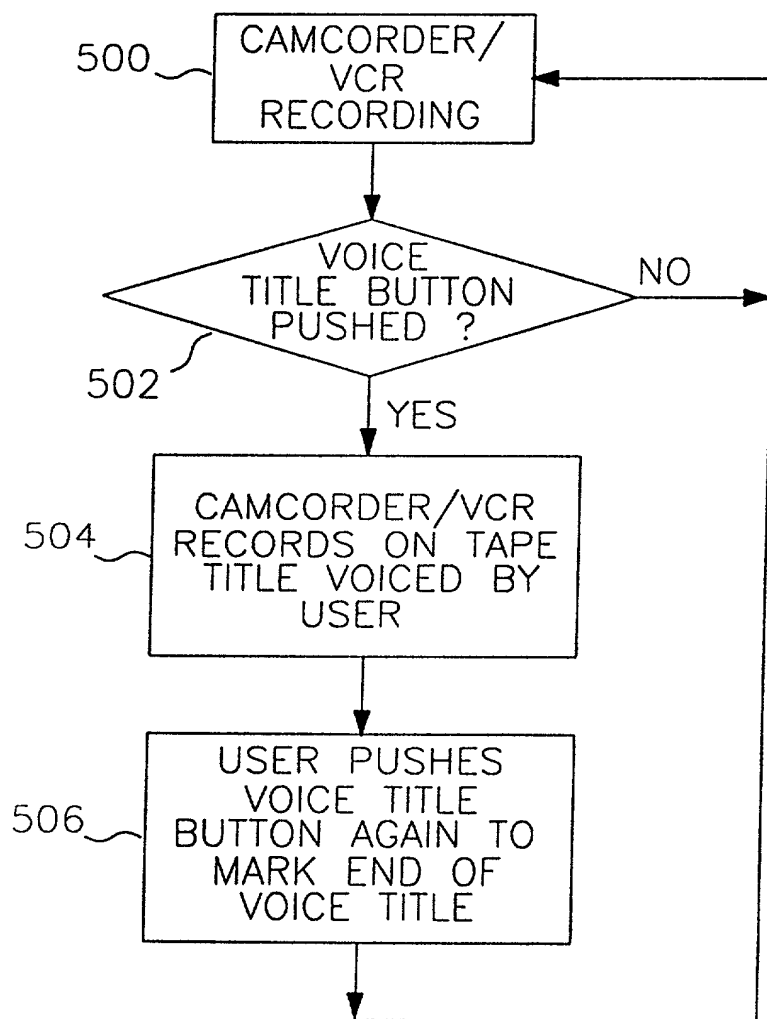


FIG. 13

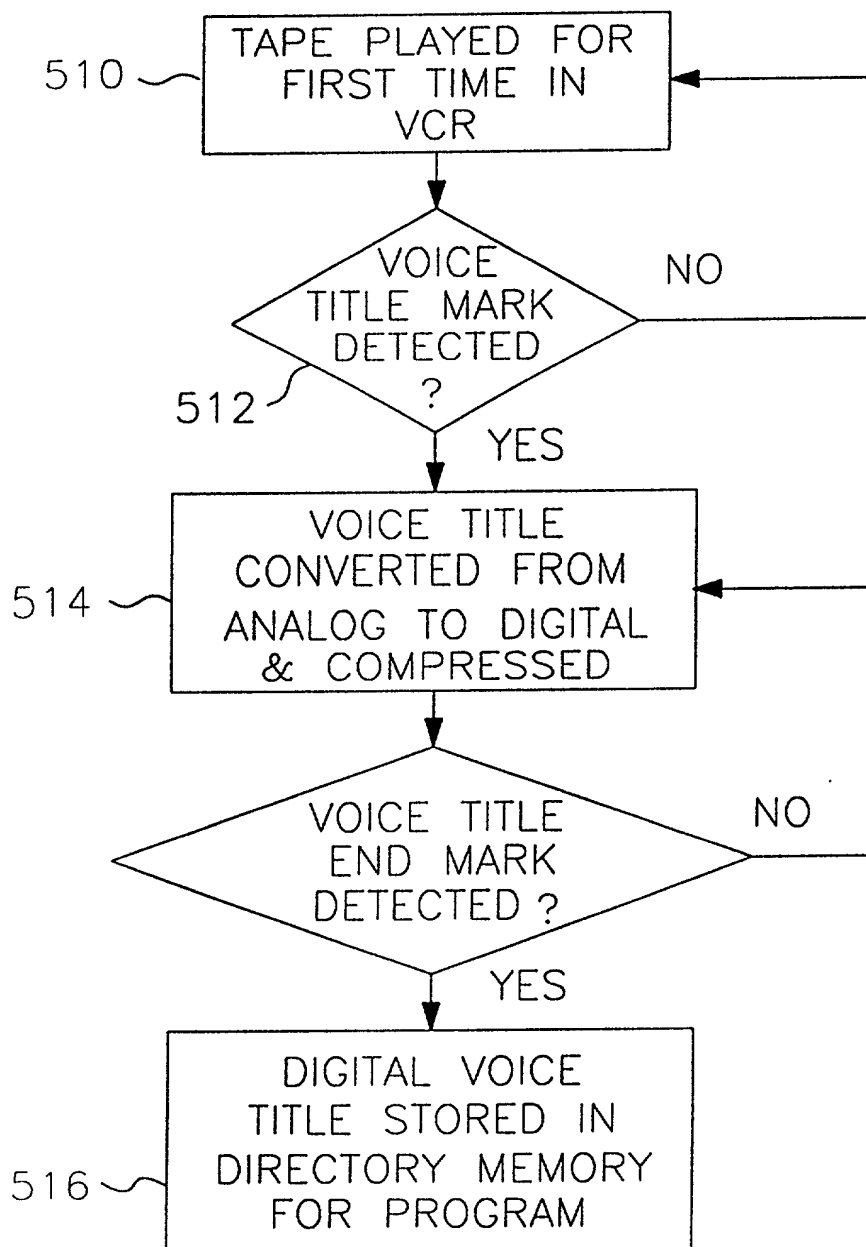


FIG. 14

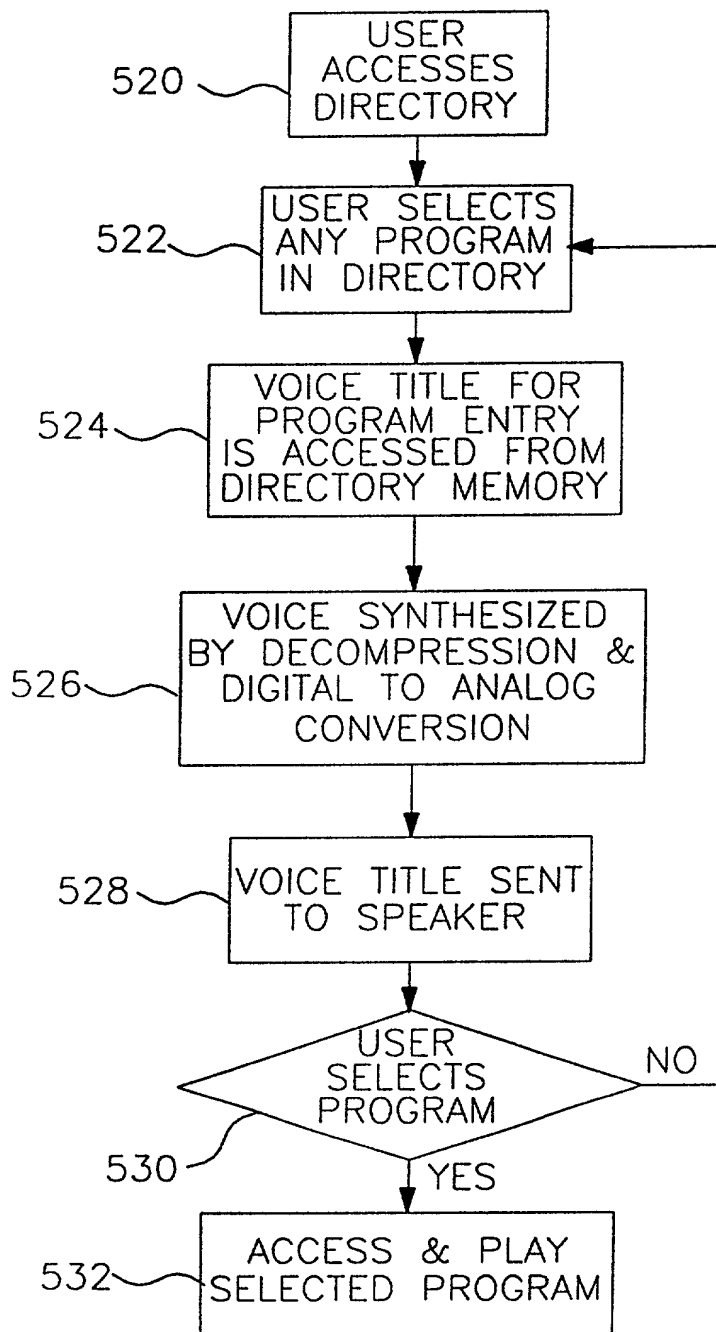


FIG. 15

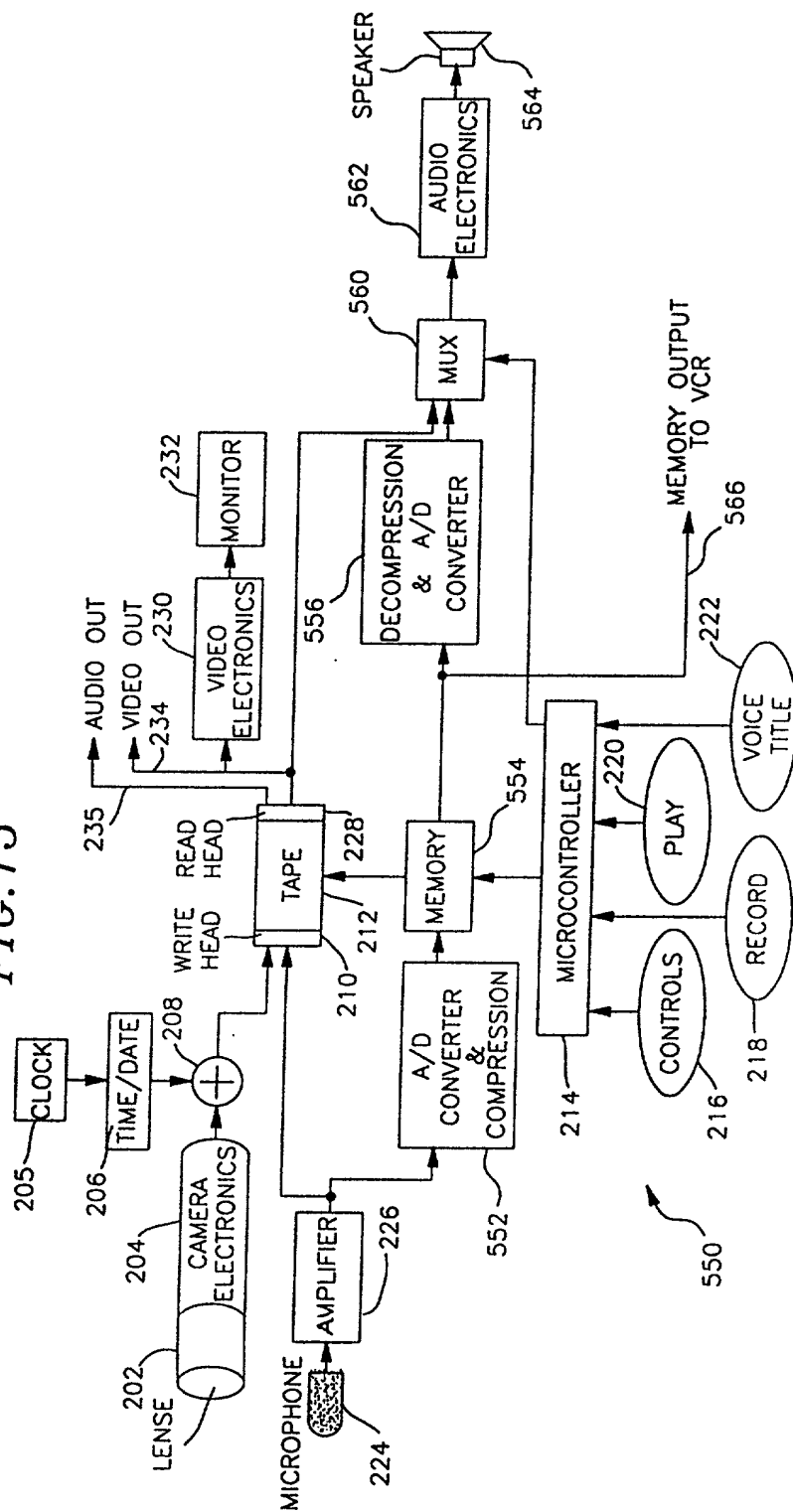






Fig. 17

SEGMENT DIRECTORY

<u>DATE-TIME</u>	<u>LENGTH</u>	<u>VOICE TITLE AVAILABLE</u>
1/30/92 13:49:00	40min 10sec	Y
3/15/93 8:10:52	20min 55sec	Y
9/30/93 10:11:00	30min 55sec	N
1/31/94 15:50:10	45min 0sec	Y
4/5/94 11:10:12	10min 10sec	Y

690

694 { 696 { 698 { 699

692

Fig. 18

INDEX TAPE NO. 8

	<u>TITLE</u>	<u>MIN</u>
1.	WHEEL OF FORTUNE	30
2.	ENTERTAINMENT TONITE	30
3.	MURPHY BROWN (CH2, 10/17, 1PM) (5941)	30
4.	VOICE TITLE	90
5.	END	60

HIGHLIGHT SELECTION

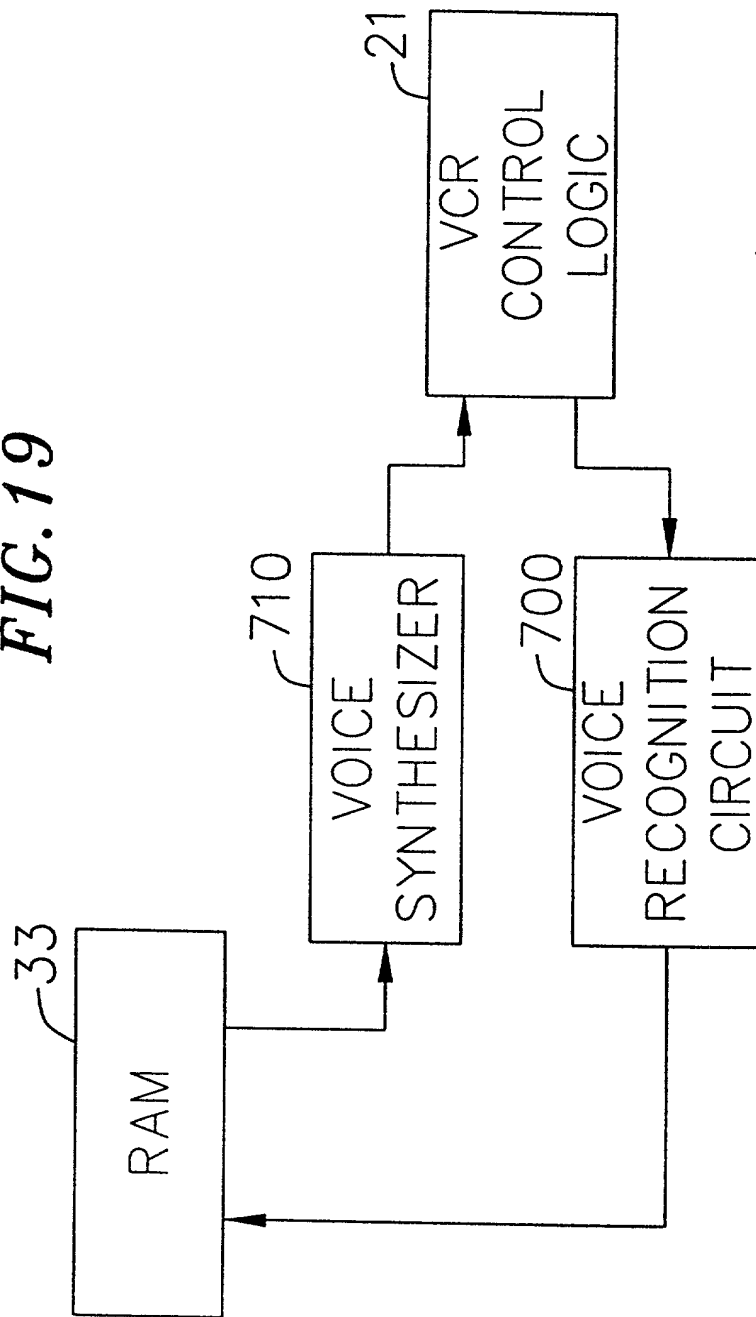
640

644

646

642

FIG. 19



**DECLARATION AND POWER OF ATTORNEY  
FOR PATENT APPLICATIONS**

PATENT

Docket No. : 33853/PYI/I148  
Attorney : Patrick Y. Ikehara

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled APPARATUS AND METHODS FOR VOICE TITLES, the specification of which is attached hereto unless the following is checked:

\_\_\_ was filed on \_\_\_ as United States Application Number or PCT International Application Number \_\_\_ and was amended on \_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of the foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

<u>Application Number</u>	<u>Country</u>	<u>Filing Date (day/month/year)</u>	<u>Priority Claimed</u>
PCT/US96/05767	PCT	26 APRIL 1996	YES

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

<u>Application Number</u>	<u>Filing Date</u>
60/070,056	December 30, 1997

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

<u>Application Number</u>	<u>Filing Date</u>	<u>Patented/Pending/Abandoned</u>
08/894,145	August 12, 1997	Pending

**POWER OF ATTORNEY:** I hereby appoint the following attorneys and agents of the law firm CHRISTIE, PARKER & HALE, LLP to prosecute this application and any international application under the Patent Cooperation Treaty based on it and to transact all business in the U.S. Patent and Trademark Office connected with either of them in accordance with instructions from the assignee of the entire interest in this application; or from the first or sole inventor named below in the event the application is not assigned; or from \_\_\_ in the event the power granted herein is for an application filed on behalf of a foreign attorney or agent.

R. W. Johnston	(17,968)	Vincent G. Gioia	(19,959)	Robert D. Rowlett	(41,279)
D. Bruce Prout	(20,958)	Edward R. Schwartz	(31,135)	Kathleen M. Olster	(42,052)

**DECLARATION AND POWER OF ATTORNEY  
FOR PATENT APPLICATIONS**

Docket No. 33/PYU/148

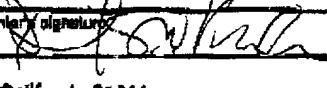
Hayden A. Carney	(22,853)	John D. Carpenter	(34,133)	Daniel M. Cavanagh	(41,661)
Richard J. Ward, Jr.	(24,187)	David A. Plumley	(37,206)	Melty A. Holman	(40,022)
Russell R. Palmer, Jr.	(22,864)	Wesley W. Monroe	(38,778)	Lucinda G. Auciello	(42,270)
LeRoy T. Rahn	(20,368)	Grant T. Langton	(38,739)	Norman E. Carte	(30,455)
Richard D. Seibel	(22,134)	Constantine Marantidis	(39,759)	Joel A. Kauth	(41,888)
Walter G. Maxwell	(25,355)	John W. Eldredge	(37,613)	Patrick Y. Ikehara	(42,681)
William P. Christie	(28,371)	Gregory S. Lampart	(35,581)	Mark Garcia	(31,953)
David A. Dillard	(30,831)	Craig A. Gelfound	(41,032)	Gary J. Nelson	(P-44,257)
Thomas J. Daly	(32,213)	Syed A. Hasan	(41,057)	Raymond R. Tabandeh	(P-43,845)

The authority under this Power of Attorney of each person named above shall automatically terminate and be revoked upon such person ceasing to be a member or associate of or of counsel to that law firm.

**DIRECT TELEPHONE CALLS TO :** Patrick Y. Ikehara, 626/795-9800; 213/681-1800

**SEND CORRESPONDENCE TO :** CHRISTIE, PARKER & HALE, LLP, P.O. Box 7068, Pasadena, CA 91108-7068

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor Daniel S. KWON	Inventor's signature 	Date 12-29-98
Residence and Post Office Address 3976 Hampstead Road, La Canada/Flintridge, California 91011		Citizenship USA

Full name of second joint inventor Henry C. YUEN	Inventor's signature	Date
Residence and Post Office Address Post Office Box 1150, Redondo Beach, California 90278		Citizenship USA

FILE, PAS106357, 12-13-98 12:28 pm

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**DECLARATION AND POWER OF ATTORNEY  
FOR PATENT APPLICATIONS**

---

PATENT

Docket No. : 33853/PYI/1148  
 Attorney : Patrick Y. Ikehara

---

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled APPARATUS AND METHODS FOR VOICE TITLES, the specification of which is attached hereto unless the following is checked:

\_\_\_ was filed on \_\_\_ as United States Application Number or PCT International Application Number \_\_\_ and was amended on \_\_\_ (if applicable).

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<u>Application Number</u>	<u>Filing Date</u>
60/070,056	December 30, 1997

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

<u>Application Number</u>	<u>Filing Date</u>	<u>Patented/Pending/Abandoned</u>
08/894,145	August 12, 1997	Pending

**POWER OF ATTORNEY:** I hereby appoint the following attorneys and agents of the law firm CHRISTIE, PARKER & HALE, LLP to prosecute this application and any international application under the Patent Cooperation Treaty based on it and to transact all business in the U.S. Patent and Trademark Office connected with either of them in accordance with instructions from the assignee of the entire interest in this application; or from the first or sole inventor named below in the event the application is not assigned; or from \_\_\_ in the event the power granted herein is for an application filed on behalf of a foreign attorney or agent.

R. W. Johnston	(17,968)	Vincent G. Gioia	(19,958)	Robert D. Rowlett	(41,279)
D. Bruce Prout	(20,958)	Edward R. Schwartz	(31,135)	Kathleen M. Olster	(42,052)

# DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS

**Docket No. 33/PYI/148**

Hayden A. Carney	(22,653)	John D. Carpenter	(34,133)	Daniel M. Cavanagh	(41,661)
Richard J. Ward, Jr.	(24,187)	David A. Plumley	(37,208)	Molly A. Holman	(40,022)
Russell R. Palmer, Jr.	(22,994)	Wesley W. Monroe	(39,778)	Lucinda G. Auciello	(42,270)
LeRoy T. Rahn	(20,356)	Grant T. Langton	(39,739)	Norman E. Carte	(30,455)
Richard D. Seibel	(22,134)	Constantine Marantidis	(39,759)	Joel A. Kauth	(41,886)
Walter G. Maxwell	(25,355)	John W. Eldredge	(37,613)	Patrick Y. Ikehara	(42,681)
William P. Christie	(29,371)	Gregory S. Lampert	(35,581)	Mark Garscia	(31,953)
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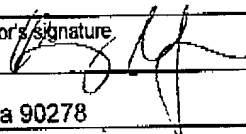
The authority under this Power of Attorney of each person named above shall automatically terminate and be revoked upon such person ceasing to be a member or associate of or of counsel to that law firm.

**DIRECT TELEPHONE CALLS TO** : Patrick Y. Ikehara, 626/795-9900; 213/681-1800

**SEND CORRESPONDENCE TO** : CHRISTIE, PARKER & HALE, LLP, P.O. Box 7068, Pasadena, CA 91109-7068

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor <b>Daniel S. KWOH</b>	Inventor's signature	Date
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